

What Is Claimed Is:

1. A linear chemical mechanical polishing apparatus equipped with a programmable pneumatic support platen comprising:  
a wafer carrier for holding and rotating a wafer mounted thereon with a first surface to be polished exposed and facing downwardly;

a continuous belt for mounting a plurality of polishing pads thereon;

a motor means for providing rotational motion in a predetermined direction of said continuous belt; and

a support platen situated juxtaposed to a bottom surface of said continuous belt corresponding to a position of said wafer carrier so as to force said polishing pad against said first surface of the wafer, said support platen having a predetermined thickness, a plurality of apertures therethrough and a plurality of openings in a top surface in fluid communication with a gas source through said plurality of apertures.

2. A linear chemical mechanical polishing apparatus equipped with a programmable pneumatic support platen according to claim 1, wherein said plurality of openings in said top surface being arranged in a plurality of concentric circles.

3. A linear chemical mechanical polishing apparatus equipped with a programmable pneumatic support platen according to claim 1, wherein said plurality of openings in said top surface being arranged in at least three concentric circles.

4. A linear chemical mechanical polishing apparatus equipped with a programmable pneumatic support platen according to claim 1, wherein said plurality of openings in said top surface being arranged in about six concentric circles.

5. A linear chemical mechanical polishing apparatus equipped with a programmable pneumatic support platen according to claim 1, wherein each of said plurality of openings having a diameter between about 0.1 mm and about 10 mm.

6. A linear chemical mechanical polishing apparatus equipped with a programmable pneumatic support platen according to claim 1, wherein each of said plurality of openings having a diameter preferably between about 1 mm and about 5 mm.

7. A linear chemical mechanical polishing apparatus equipped with a programmable pneumatic support platen according to claim 1, wherein said plurality of openings having different diameters.

8. A linear chemical mechanical polishing apparatus equipped with a programmable pneumatic support platen according to claim 3, wherein said plurality of openings arranged in at least three concentric circles being controlled in at least three zones with each zone controlling a plurality of openings in the same concentric circle.

9. A linear chemical mechanical polishing apparatus equipped with a programmable pneumatic support platen according to claim 8 further comprising a pressure detector and a flow regulator for each of said at least three zones.

10. A linear chemical mechanical polishing apparatus equipped with a programmable pneumatic support platen according to claim 8 further comprising a process controller for detecting and regulating a pressure and a flow rate of said gas flow in each of said at least three zones.

11. A method for controlling the polishing profile on a wafer surface during a linear chemical mechanical polishing (CMP) process comprising the steps of:

providing a linear CMP apparatus comprising a wafer carrier for holding and rotating a wafer mounted thereon with a first surface to be polished exposed and facing downwardly; a continuous belt for mounting a plurality of polishing pads thereon; a motor means for providing rotational motion of said continuous belt; and a support platen situated juxtaposed to a bottom surface of said continuous belt corresponding to a position of said wafer carrier, said support platen having a predetermined thickness, a plurality of apertures therethrough and a plurality of openings in a top surface in fluid communication with a gas source;

rotating said continuous belt in a predetermined direction;

engaging said first surface of the wafer to said polishing pad; and

flowing a gas flow through said plurality of apertures and said plurality of openings and forcing an intimate contact between said first surface of the wafer and said polishing pad.

12. A method for controlling the polishing profile on a wafer surface during a linear CMP process according to claim 11 further comprising the step of providing a plurality of pressure detectors, a plurality of flow regulators and a process controller.

13. A method for controlling the polishing profile on a wafer surface during a linear CMP process according to claim 11 further comprising the step of dividing said plurality of openings in at least three zones with a pressure in each zone controlled independently.

14. A method for controlling the polishing profile on a wafer surface during a linear CMP process according to claim 11 further comprising the step of dividing said plurality of openings in at least three zones wherein each zone being equipped with a pressure detector and a flow regulator for outputting a predetermined pressure.

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15. A method for controlling the polishing profile on a wafer surface during a linear CMP process according to claim 11 further comprising the steps of:

detecting a pressure of gas flow through a preselected zone incorporating a preselected plurality of openings and sending a first signal to a process controller;

comparing said first signal with a pre-stored value in the process controller and sending a second signal to a flow regulator responsive to said preselected zone; and

altering said pressure of said gas flow responsive to said second signal until said first signal substantially equals to said pre-stored value in the process controller.

16. A method for controlling the polishing profile on a wafer surface during a linear CMP process according to claim 11 further comprising the step of flowing a gas flow of air or nitrogen through said plurality of apertures and said plurality of openings.

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17. A method for controlling the polishing profile on a wafer surface during a linear CMP process according to claim 11 further comprising the step of dividing said plurality of openings in at least three zones wherein each zone being arranged in a concentric circle.

18. A method for controlling the polishing profile on a wafer surface during a linear CMP process according to claim 11 further comprising the step of dividing said plurality of openings in about six zones wherein each zone being arranged in a concentric circle.